IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP AF**
Mark Lawrence Williams	Group Art Unit: **2462**
Application No.: 10/581,791	Examiner: LEON T. ANDREWS
Filing Date: June 6, 2006	Confirmation No.: 5493
Title: A METHOD FOR ESTIMATING A SYSTEM STATE IN A NETWORK	

PRE-APPEAL BRIEF REQUEST FOR REVIEW

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant requests review of the final rejection in the above-identified application. This request is void of amendments and is filed concurrently with a Notice of Appeal.

In numbered paragraph 1 on page 2 of the Office Action, claims 1-9 are rejected under 35 U.S.C. §103(a) by *Mookerjee et al* (U.S. Patent No. 7,180,443) in view of *Eid et al* (U.S. Patent No. 6,502,042).

As provided in Figs 1-5, exemplary methods are directed to the efficient decentralization of a particle filter. The method is achieved through a compact representation of a particle population. Each sensor node sends its tracks to neighboring nodes. The neighboring nodes update their respective tracks using the new information by dividing the local track PDF by the incoming track. The neighboring node then sends out its own tracks. A local particle population is used to generate a Gaussian mixture approximation. The local and incoming PDFs are evaluated at each particle position, divided, and applied as a weight to the particles.

Independent claims 1 and 5 broadly encompass the foregoing features by reciting, among other elements, maintaining a set of particles and associated

weights, which represent an estimate of the system state, representing the estimated system state as a mixture of Gaussian distributions, and communicating said mixture to neighboring nodes, and in response to receiving said mixture from a neighboring node, updating the estimate of the system state that is maintained at the node.

The combination of *Mookerjee* and *Eid* fails to disclose or suggest every feature recited in the claims as alleged.

Mookerjee discloses a system that estimates the states of a system having multidimensional parameters. The system uses Kalman filters to explicitly include the physical bounds on uncertain parameters, separates a state estimation covariance into components attributable to measurement error and parameter uncertainty, and separately propagates these covariances from one time index k to a next time index k+1. Based on the propagated covariances, the gain matrix K is computed to weigh the measurements and establish the state estimates.

In a previous response filed on October 13, 2009, Applicant argued that the Kalman filters described by *Mookerjee* are not analogous to the particle filter architecture recited in Applicant's claims. Namely, one of ordinary skill would understand that a Kalman filter and a particle filter are two distinct estimation techniques such that a Kalman filter is incapable of maintaining a set of particles and associated weights as does the estimation technique recited in independent claims 1 and 5. The Examiner's failure to respond to this argument in the final Office Action serves as acquiescence to Applicant's position. Hence, these established distinctions render the obviousness rejection improper and worthy of withdrawal.

In the previous response Applicant also argued that the system of *Mookerjee* fails to include a feature of representing the estimated system state as a mixture of Gaussian distributions. In the final rejection, the Examiner responds to this argument by citing to *Mookerjee* at column 9, lines 9-30. Here, *Mookerjee* discloses

the use of filter model which represents the maximum accelerations using a statistical model that includes a multivariate Gaussian distribution of constant accelerations. The multivariate Gaussian distribution, however, is established in the context of Kalman filters to represent maximum accelerations as opposed to representing a current particle distribution for the purposes of communication along a channel filter, and then using that mixture of Gaussians to calculate an update to the system state estimate and applying it to the particle distributions in the receiving nodes as is embodied and recited in claim 1. One of ordinary skill would understand that *Mookerjee* does not disclose or suggest a mixture of Gaussian distributions as alleged by the Examiner. Thus, for at these reasons withdrawal of the final rejection is deemed appropriate.

The Examiner concedes that *Mookerjee* fails to disclose a plurality of nodes as recited in the claims, and relies on *Eid* in an effort to remedy this deficiency. However, Applicant does not believe that a sufficient nexus exists between these references such that their hypothetical combination is reasonable.

Eid is directed to a fault tolerant liquid measurement system that includes a plurality of sensors for measuring parameters of a liquid in a container, and uses a neural network to process sensor measurement signals.

Mookerjee is related to a parameter estimation system that includes a method of empirical optimization. The parameter estimation is described in the context of a target tracking system that includes a radar system and an aircraft. More importantly, *Mookerjee* does not disclose the implementation of this system across a network of plural nodes.

The Examiner alleges that one of ordinary skill would combine the system of *Mookerjee* with the network implementation described in *Eid*. However, as one of ordinary skill would understand, neural networks require training and the neural

network in its entirety processes the input sensor signals. In other words, the propagation of parameters and signals throughout the entirety of a network like *Eid* would likely frustrate the calculation of estimates to operate a control system or control a process as discussed in *Mookerjee*. For at least these reasons, one of skill in the art starting with the disclosure of *Mookerjee* would not have looked to *Eid* in an effort to implement target tracking over plural nodes as is provided in a network.

Even if these references are deemed to be combinable as alleged, which Applicant does not believe that they are, based on the disclosure of *Eid* the resulting system would not be capable of processing information at each node as recited in Applicant's claims.

Based on the discussion above, the combination of *Mookerjee* and *Eid* does not establish a *prima facie* case of obviousness with respect to the combination of features recited in claims 1-9. Therefore, the final Office Action does not present a record that is appropriate for consideration by the Board of Patent Appeals and Interferences.

Withdrawal of the final Office Action is respectfully submitted to be in order.

Respectfully submitted,

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